

PATENT SPECIFICATION (11)

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- (21) Application No. 25410/78 (22) Filed 31 May 1978
 (31) Convention Application No. 2729398 (32) Filed 29 Jun 1977 in
 (33) Federal Republic of Germany (DE)
 (44) Complete Specification Published 26 Aug 1981
 (51) INT. CL.³ H02K 5/10 E05F 15/10
 (52) Index at Acceptance
 H2A BR



(54) A DEVICE COMPRISING AN ELECTRIC MOTOR AND GEARING IN A HOUSING

(71) We, SIEMENS AKTIENGESSELLSCHAFT, a German company, of Berlin and Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device comprising an electric motor and gearing in a housing. This invention more particularly, but not exclusively, relates to such a device for the opening and/or closing of windows, doors, sliding roofs or the like or motor vehicles.

According to the present invention there is provided a device comprising an electric motor, gearing connected to an output shaft of the electric motor, and a housing which houses the motor and the gearing and comprises two part-housings which provide a magnetic stator flux return path, and which part-housings are secured together in a water-tight manner.

In one embodiment of the invention, the housing comprises a pair of similar half-housings formed from steel plate. The half-housings have abutment surfaces which lie in a plane including the motor axis. Thus the motor and the associated gearing, which is directly connected to the motor, are encapsulated together in a common housing. The device should not be effected by modest shocks or other disturbances. Separate magnetic flux return plates or other members are not required.

For a better understanding of the present invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawing which shows diagrammatically one embodiment of a device according to the invention and in which:

Figure 1 shows a longitudinal section through a device;

Figure 2 shows a section of the device shown in Figure 1 taken on the line II-II of Figure 1;

Figure 3 shows a section of the device shown in Figure 1 taken on the line III-III of Figure 1; and

Figure 4 shows a section of the device shown in Figure 1 taken on the line IV-IV of Figure 1;

Figure 1 shows one half-housing or half-shell of a steel plate housing formed from two such

half-housings 1 and 2. A D.C. motor, arranged at the left hand end of the housing, has permanent magnets 5 in the form of half-shells which, as shown in Figure 4, are secured by adhesive to plates 26 which are either secured in the housing or merely retained in the housing by, for example, inwardly pressed-in projections 24 and 25. The plates 26 abut the half-housings 1 and 2. A motor shaft 7 carries, in addition to a rotor assembly 6 having an associated rotor winding and a commutator 27, a worm wheel 8 driving a pinion 19 on a drive shaft 20. The motor shaft 7 is mounted at its outer ends in spherical bearings 9 and 10 and its longitudinal travel can be adjusted by a screw 21.

The spherical bearings 9 and 10 are (as is shown in Figure 2 for the bearing 9) each mounted in two bearing supports 3 and 4 which are disposed opposite each other. Each bearing support 3 or 4 is secured in an associated half-housing 1 or 2. On assembly of half-housings 1 and 2, the bearing supports 3 and 4 engage the bearings and retain them; for this purpose, prior to assembly of the two half-housings 1 and 2, the plastics bearing supports 3 and 4, which are constructed so as to be resilient and oscillation-damping, are pressed into or engaged positively or non-positively in the respective half-housing 1 or 2, by means of projections inserted into apertures 22 and 23 of the half-housings 1 and 2. Due to this mounting, it is possible to achieve a resonance-free and quiet mounting of the motor shaft 7, despite the relatively large half-housings 1 and 2.

Tongues 11 and 12 are formed, for example by punching in half-housings 1 and 2 on their insides. These tongues 11 and 12 provide knife-edged bearings. Brush holders 17 and 18 having corresponding counter bearings are pivoted on these knife edged bearings. The brush holders 17 and 18 are generally hammer-shaped. Springs 15 and 16 act on the brush holders 17 and 18 respectively so that brushes held by the brush holders 17 and 18 are pressed against the commutator 27. The use of hammer-shaped brush holders 17 and 18 together with knife edged bearings can provide a reduction in the noise output of the motor as transfer of vibrations to the half-housings 1 and 2 is

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reduced. Furthermore, this construction is less sensitive to damage due to shocks than some known constructions.

Further tongues 13 and 14 are similarly formed, for example by punching in the insides of the half-housings 1 and 2. Ends of the springs 15 and 16 engage these tongues 13 and 14.

On assembly of the device, initially all the essential internal components, except for the bearing supports 4 associated with the half-housing 1, the brush holder 17 and the spring 15, can be inserted into the half-housing 2. Then the half-housing 1, with the bearing supports 4, the brush holder 17 and the spring 15, is located on the half-housing 2. The two half-housings 1 and 2 can then be secured together, in order to make the housing impervious, by, for example, screwing, or by welding or plastic deformation of their abutting surfaces. The apertures left by the tongues 11, 12, 13 and 14 can be sealed by a sealing substance, or by a self adhesive sheet material.

Instead of the essential components being initially located in the half-housing 2, they could be located in the half-housing 1; the half-housing 2 is then placed on the half-housing 1.

WHAT WE CLAIM IS:—

1. A device comprising an electric motor, gearing connected to an output shaft of the electric motor, and a housing which houses the motor and the gearing and comprises two part-housings which provide a magnetic stator flux return path, and which part-housings are secured together in a water-tight manner.

2. A device as claimed in claim 1, wherein there are secured to the inside of the two part-housings oscillation-damping bearing supports for bearings of the motor.

3. A device as claimed in claim 2, wherein the bearing supports are formed from a plastics material and are held in apertures in the part-housings, with a water-tight seal between each

bearing support and its corresponding part-housing.

4. A device as claimed in claim 3, in which each bearing support is pressed into an aperture of a part-housing.

5. A device as claimed in claim 2, 3 and 4, wherein each bearing has two bearing supports disposed opposite each other, one of which is secured to one part-housing, and the other or which is secured to the other part-housing.

6. A device as claimed in any preceding claim, wherein each half-housing includes on its inside a tongue which is formed in that part-housing and which provides a knife-edged bearing, and wherein for each knife-edged bearing, there is a brush holder which has a bearing that engages and pivots on the corresponding knife-edged bearing and which is acted upon by a spring means so that a brush held by the brush holder is urged against a commutator of the motor.

7. A device as claimed in claim 6, in which each part-housing includes a further tongue which is formed in that part-housing and to which one end of one of the spring means is connected.

8. A device as claimed in any preceding claim, in which the part-housings comprise half-housings major portions of which are substantially symmetrical about a plane containing their abutment surfaces.

9. A device as claimed in any preceding claim, in which the electric motor is a D.C. motor.

10. A device substantially as hereinbefore described, with reference to, and as shown in, the accompanying drawing.

11. A vehicle including a device as claimed in any preceding claim.

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COMPLETE SPECIFICATION

1 SHEET

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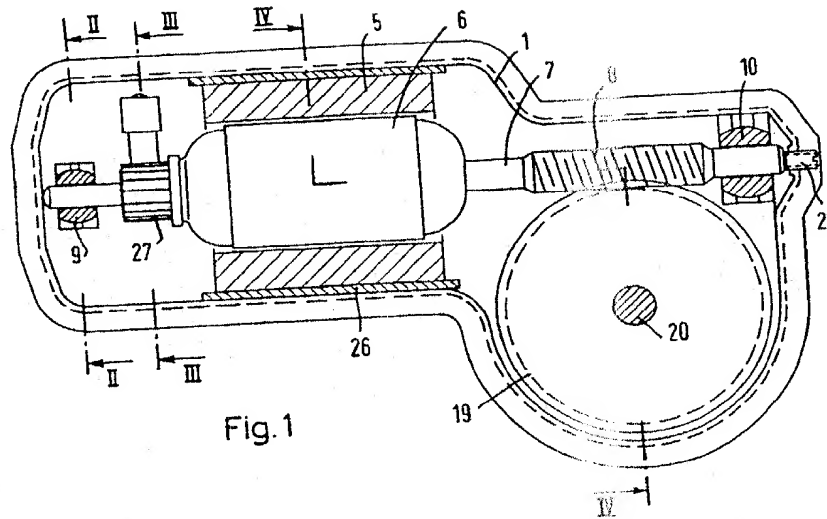


Fig. 1

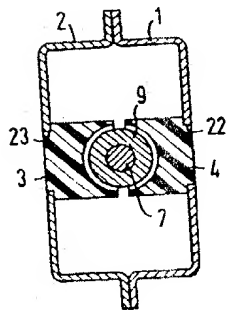


Fig. 2

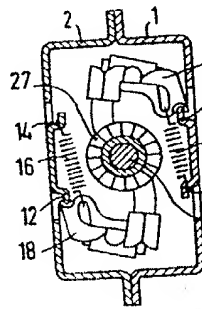


Fig. 3

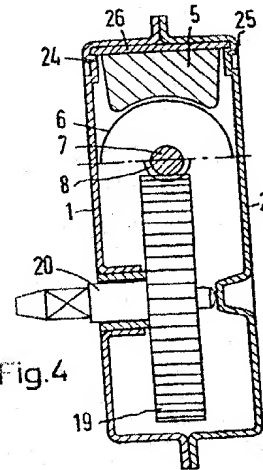


Fig. 4

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COMPLETE SPECIFICATION

1 SHEET

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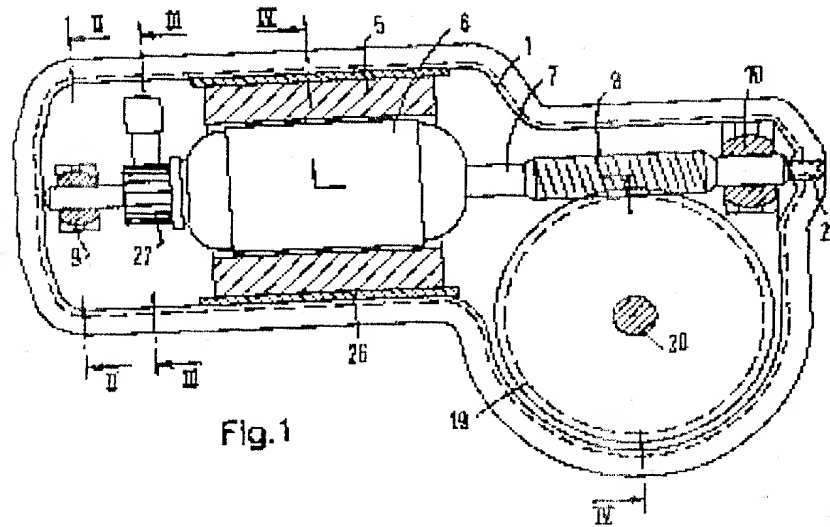


Fig. 1

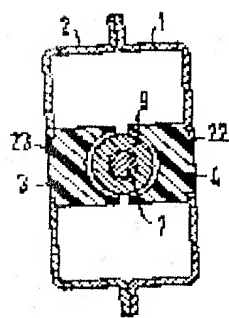


Fig. 2

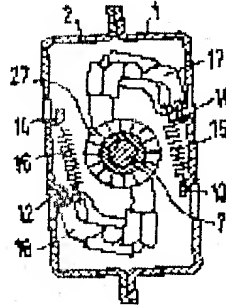


Fig. 3

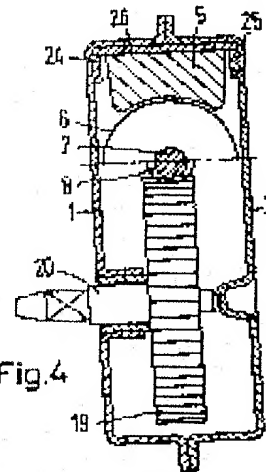


Fig. 4